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Jian et al.

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(54) **NAIL GUN WITH A NAIL GUIDING UNIT**

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B25C 1/00 (2006.01)

(52) **U.S. Cl.** **227/120**; 227/8; 227/119

(58) **Field of Classification Search** 227/120, 227/123, 109, 119, 8, 140, 148
See application file for complete search history.

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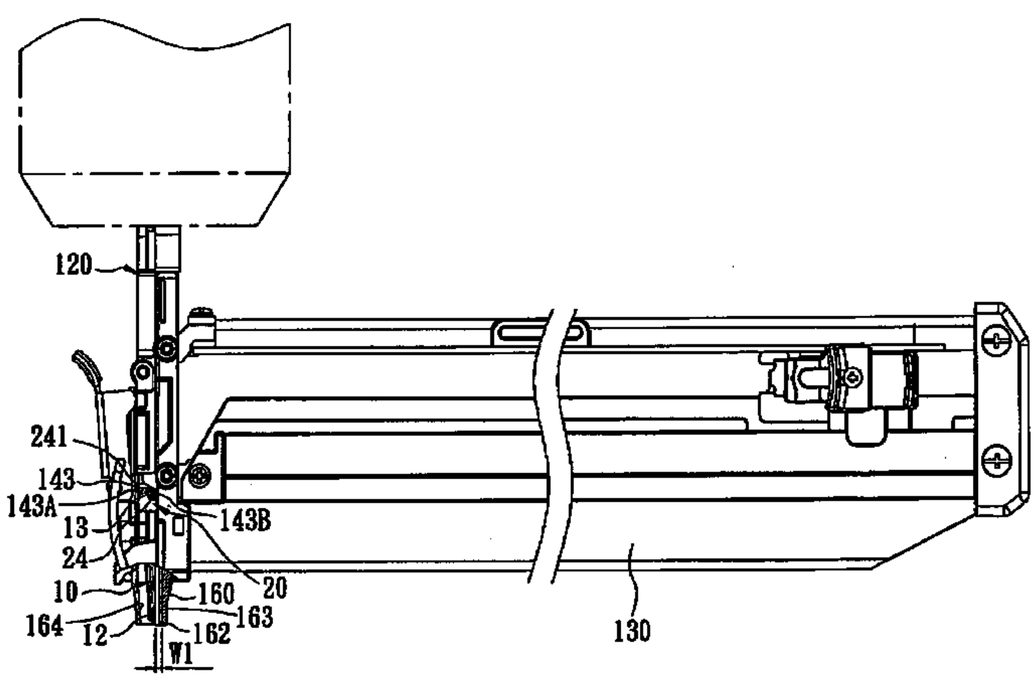
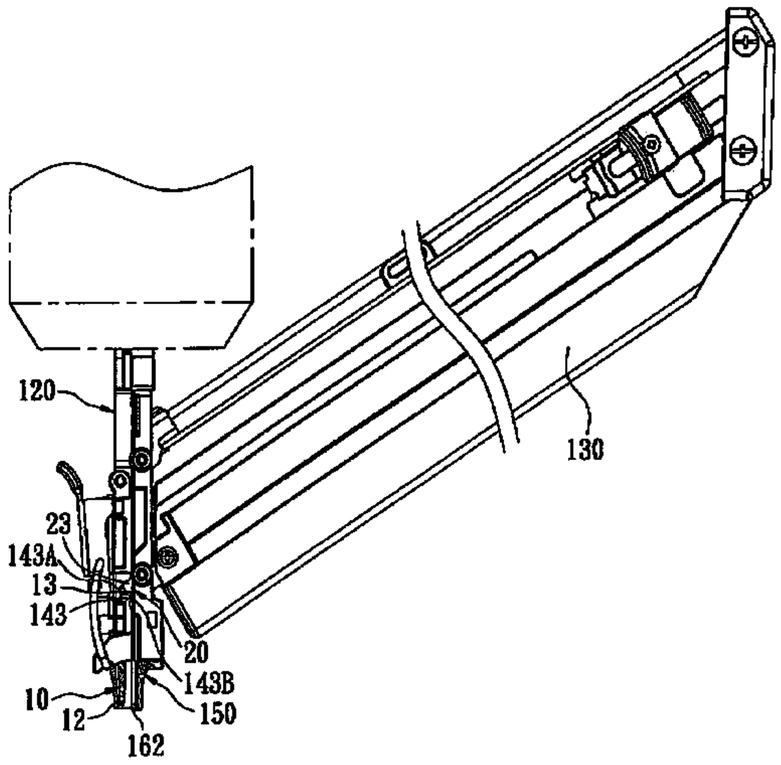
(57) **ABSTRACT**

A nail gun includes a body, a handle connected fixedly to and extending laterally from the body, a nail ejecting member disposed on the body and formed with a nail discharging passage having opposite inlet and outlet ends, a magazine member connected to the nail ejection member, and an elongated nail guiding plate disposed within the nail discharging passage, and a driving member. The nail guiding plate has a pivot end disposed pivotally within the inlet end of the nail discharging passage, a free end disposed within the outlet end of the nail discharging passage, and a driven portion disposed between the pivot end and the free end. The driving member is connected to the driven portion of the nail guiding plate for driving the free end of the nail guiding plate to pivot between first and second positions.

10 Claims, 15 Drawing Sheets





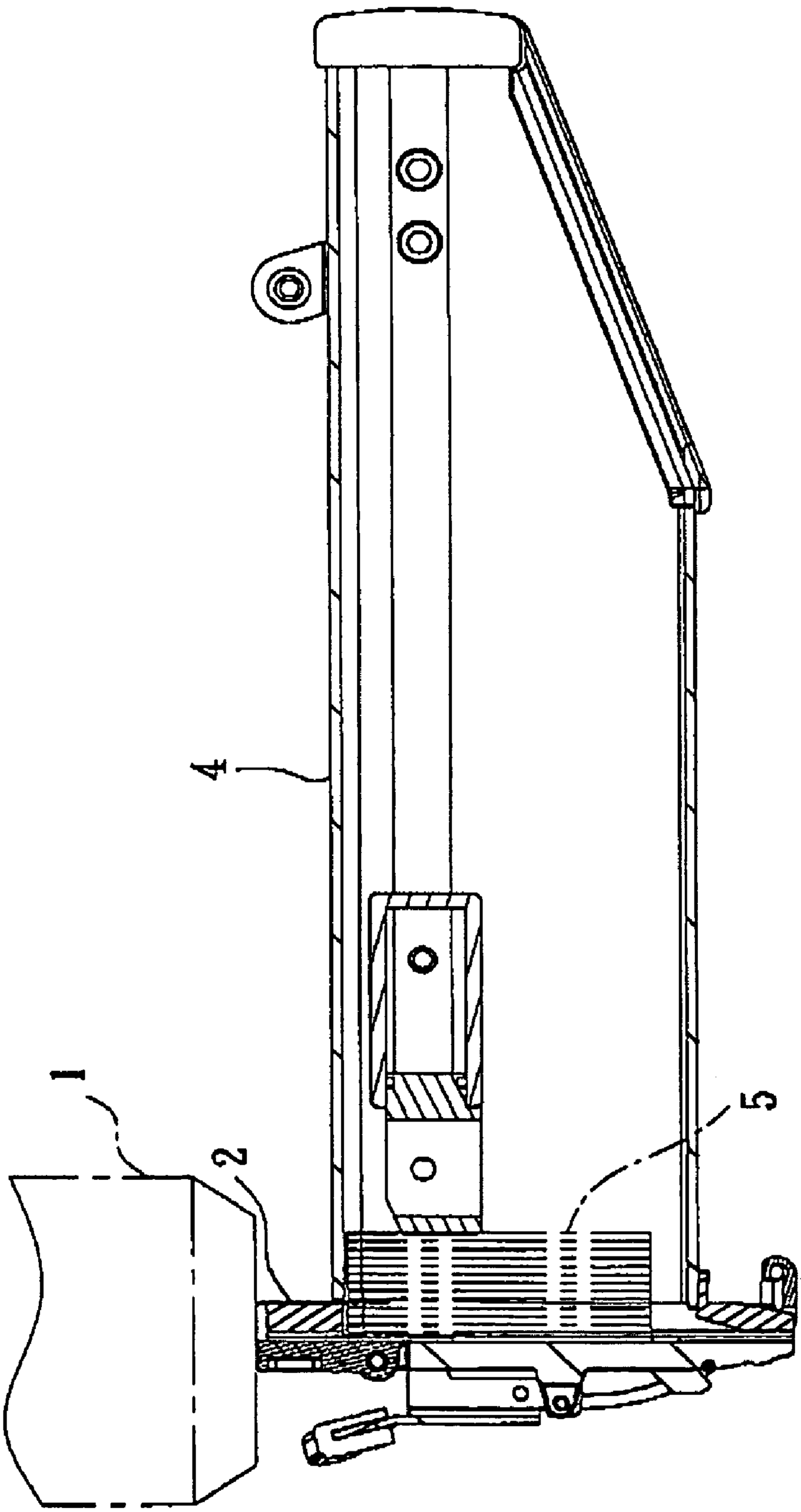


FIG. 1
PRIOR ART

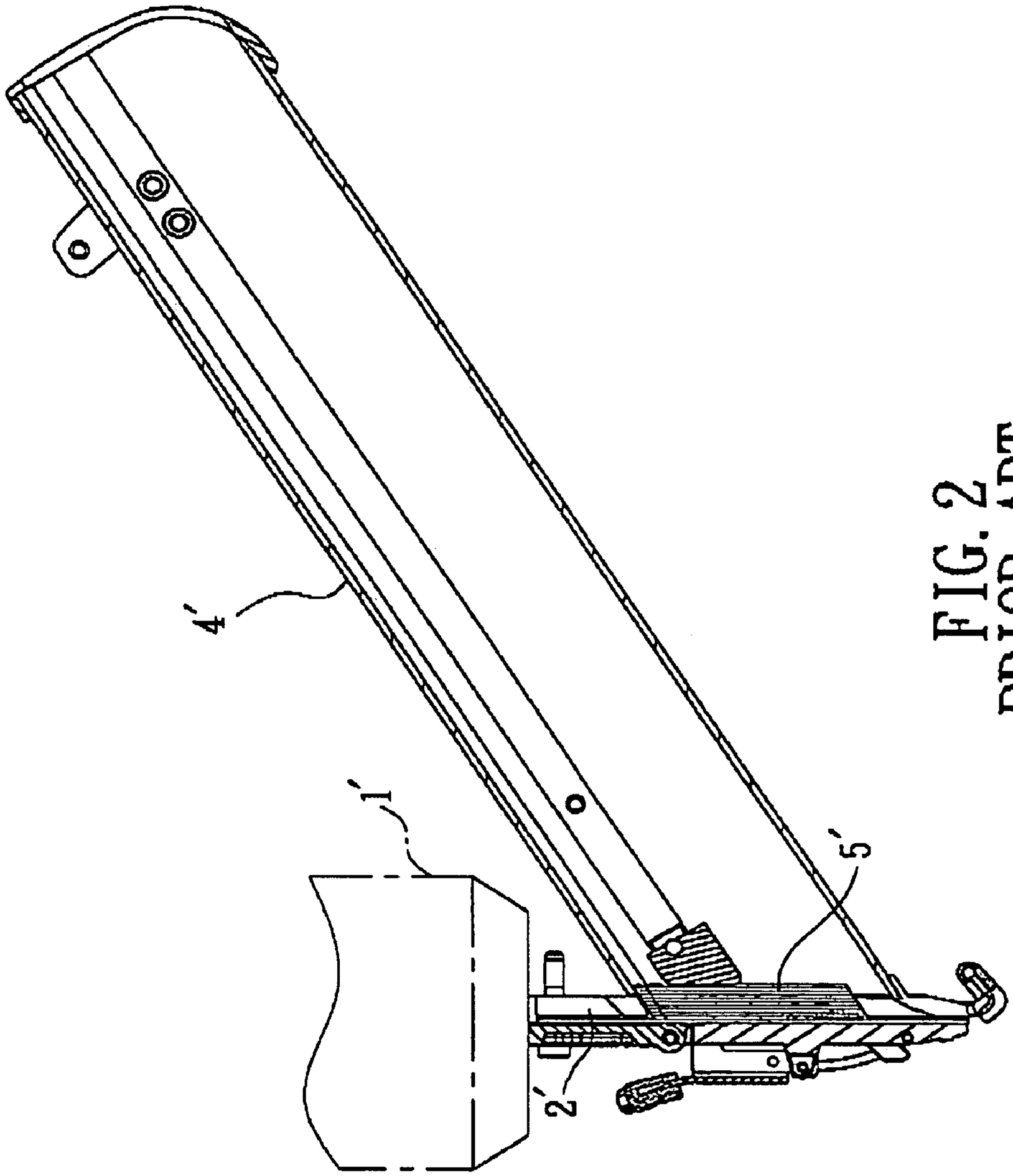


FIG. 2
PRIOR ART

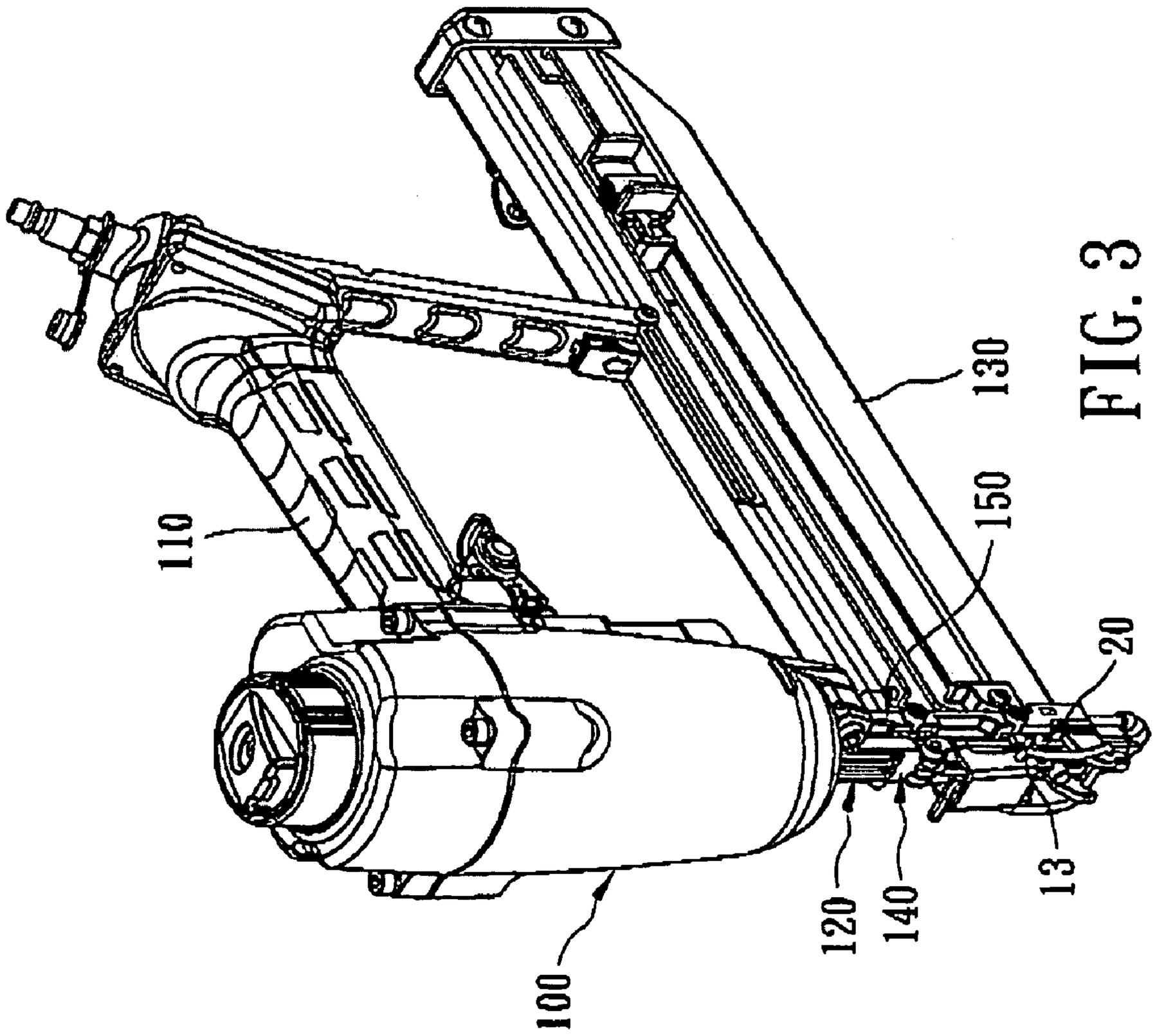


FIG. 3

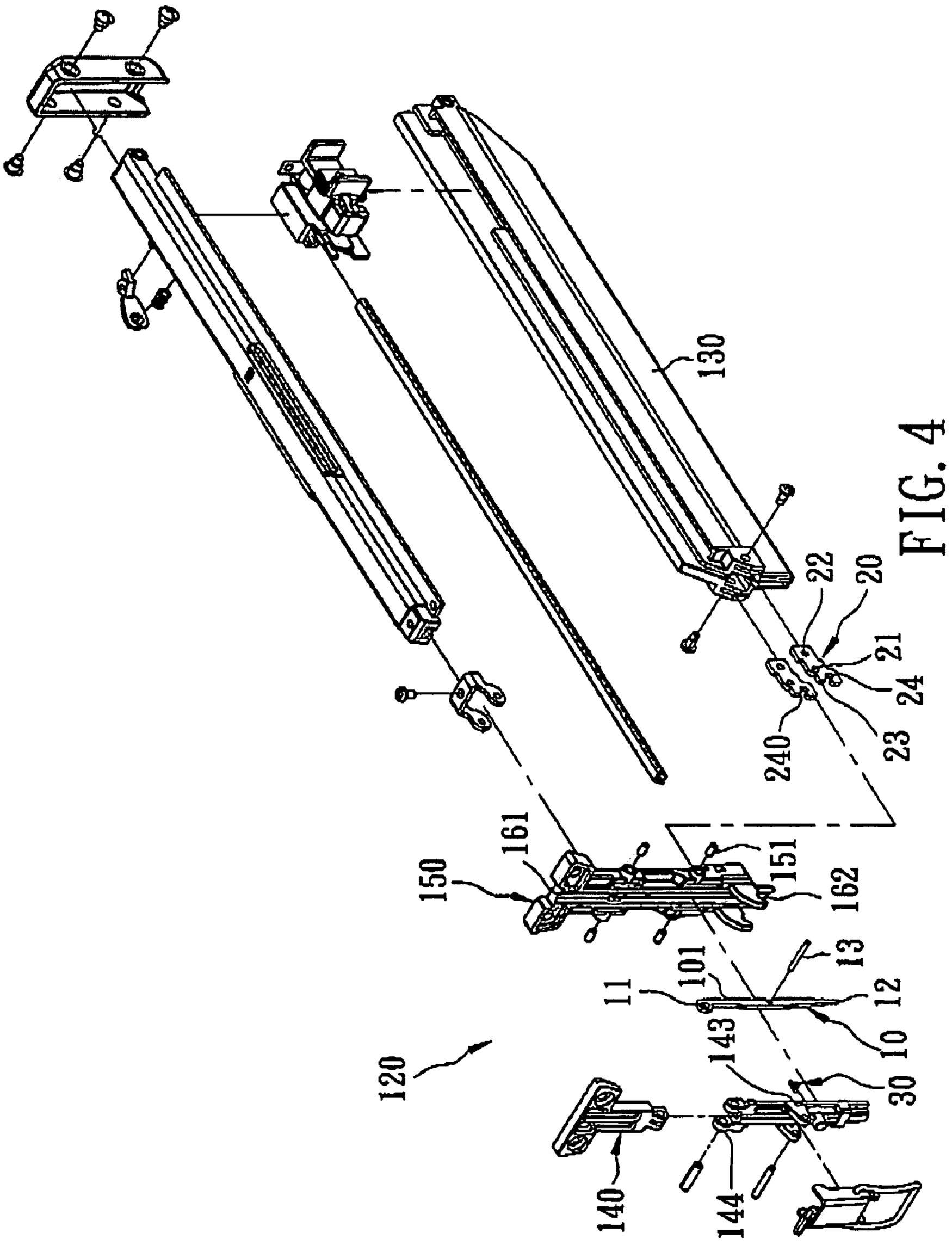

130
22
20
21
24
23
240
61
161
150
151
162
13
101
11
12
143
10
30
120
140
144

FIG. 4

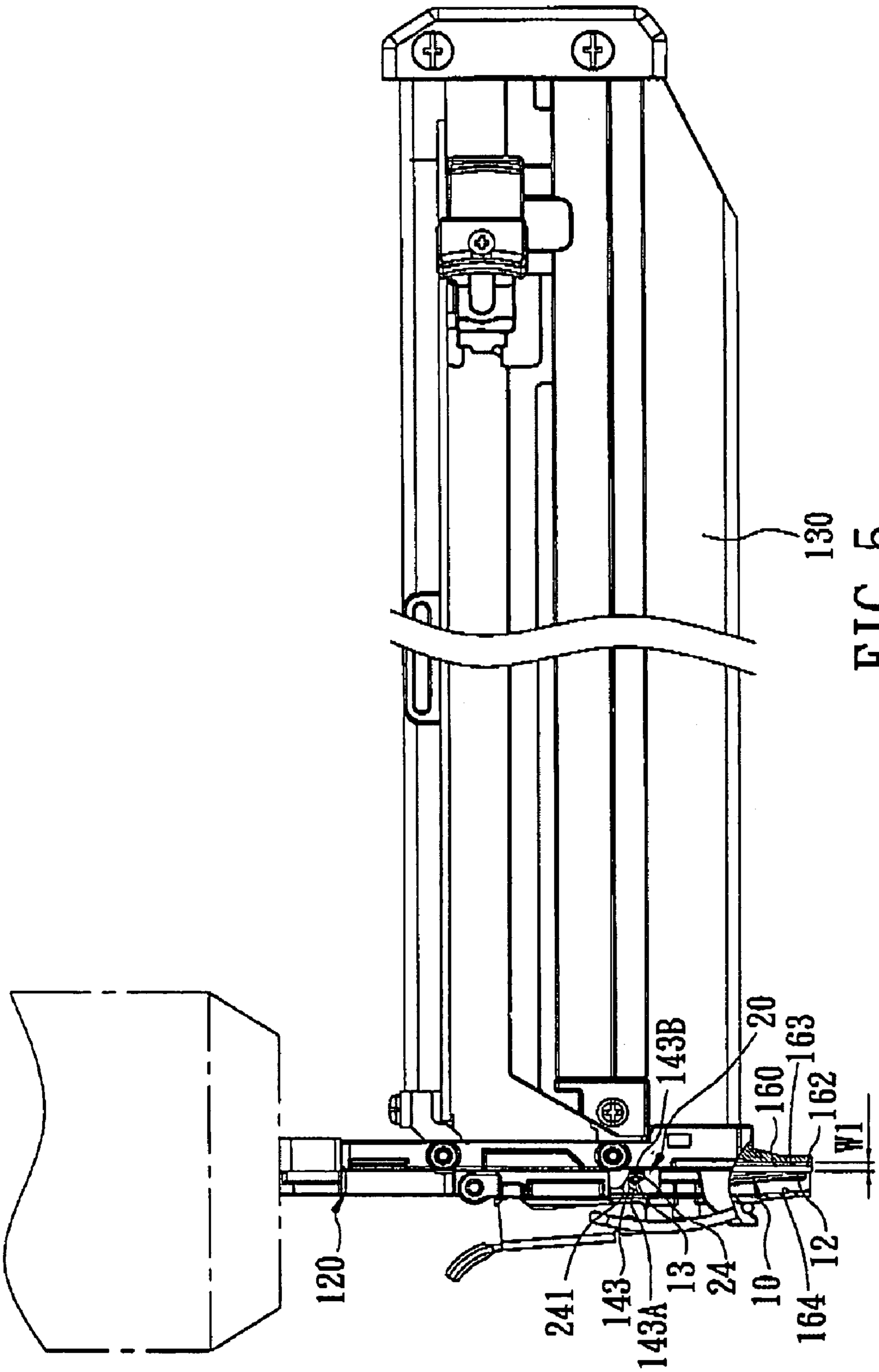


FIG. 5

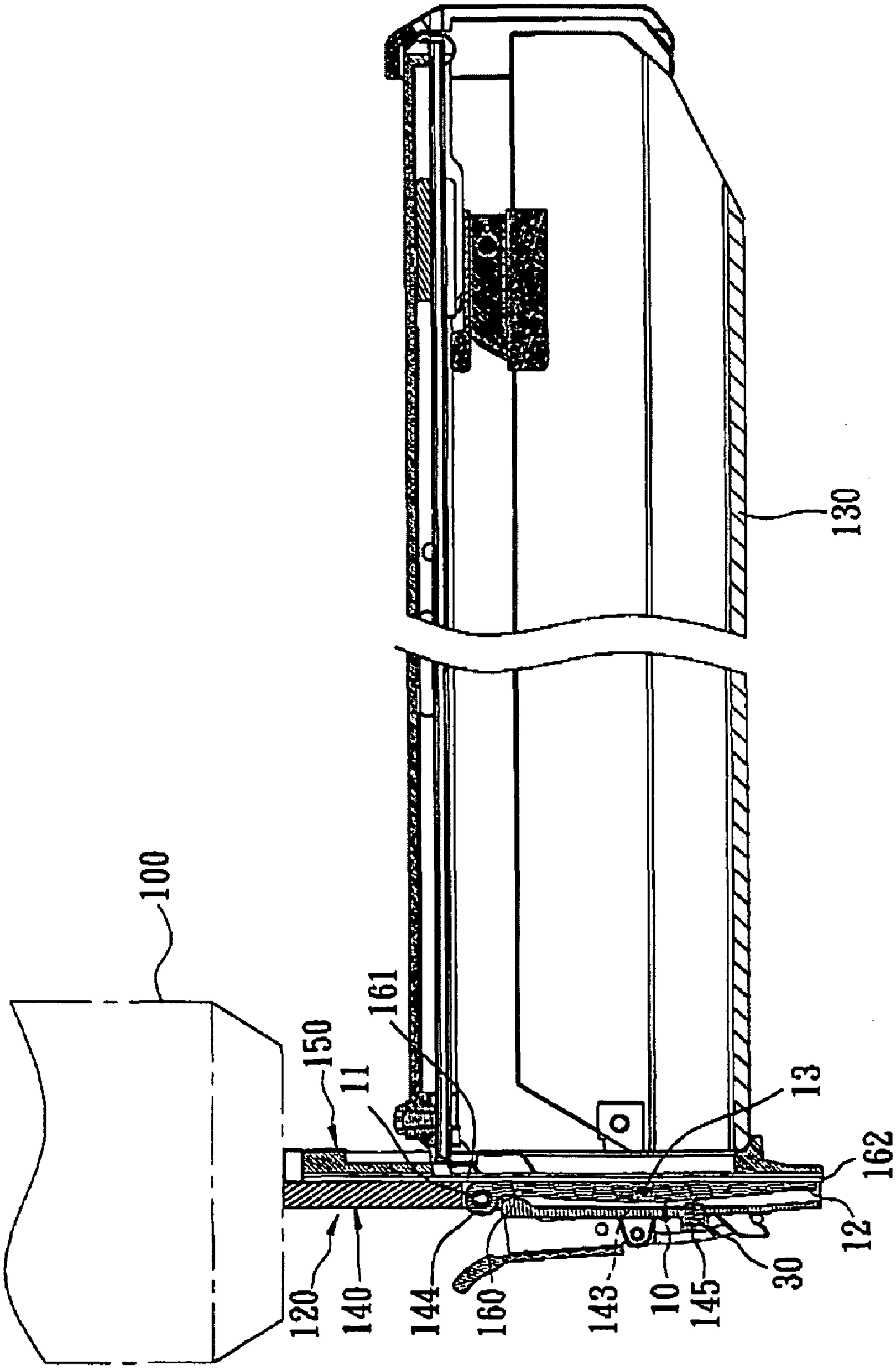


FIG. 6

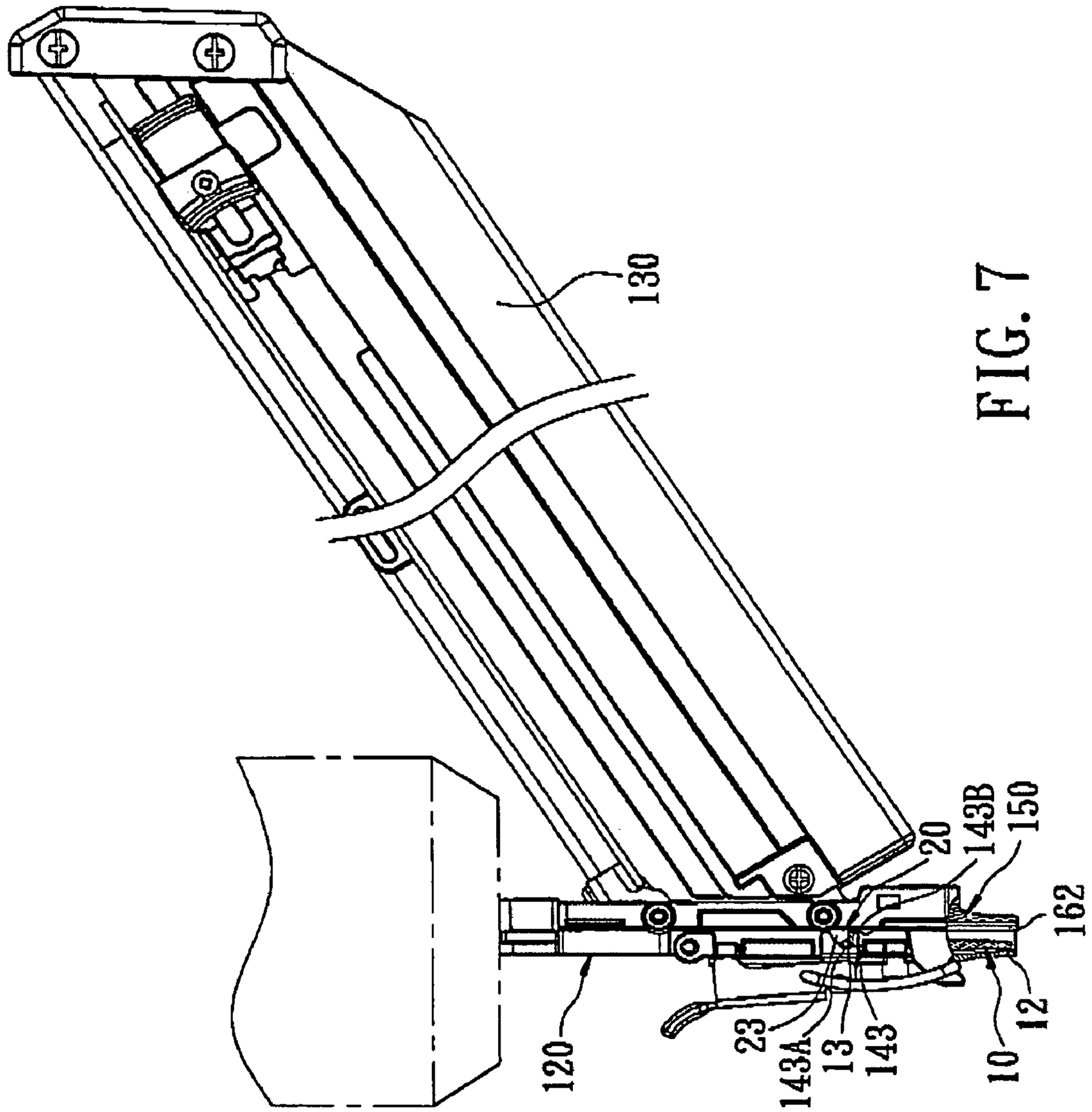


FIG. 7

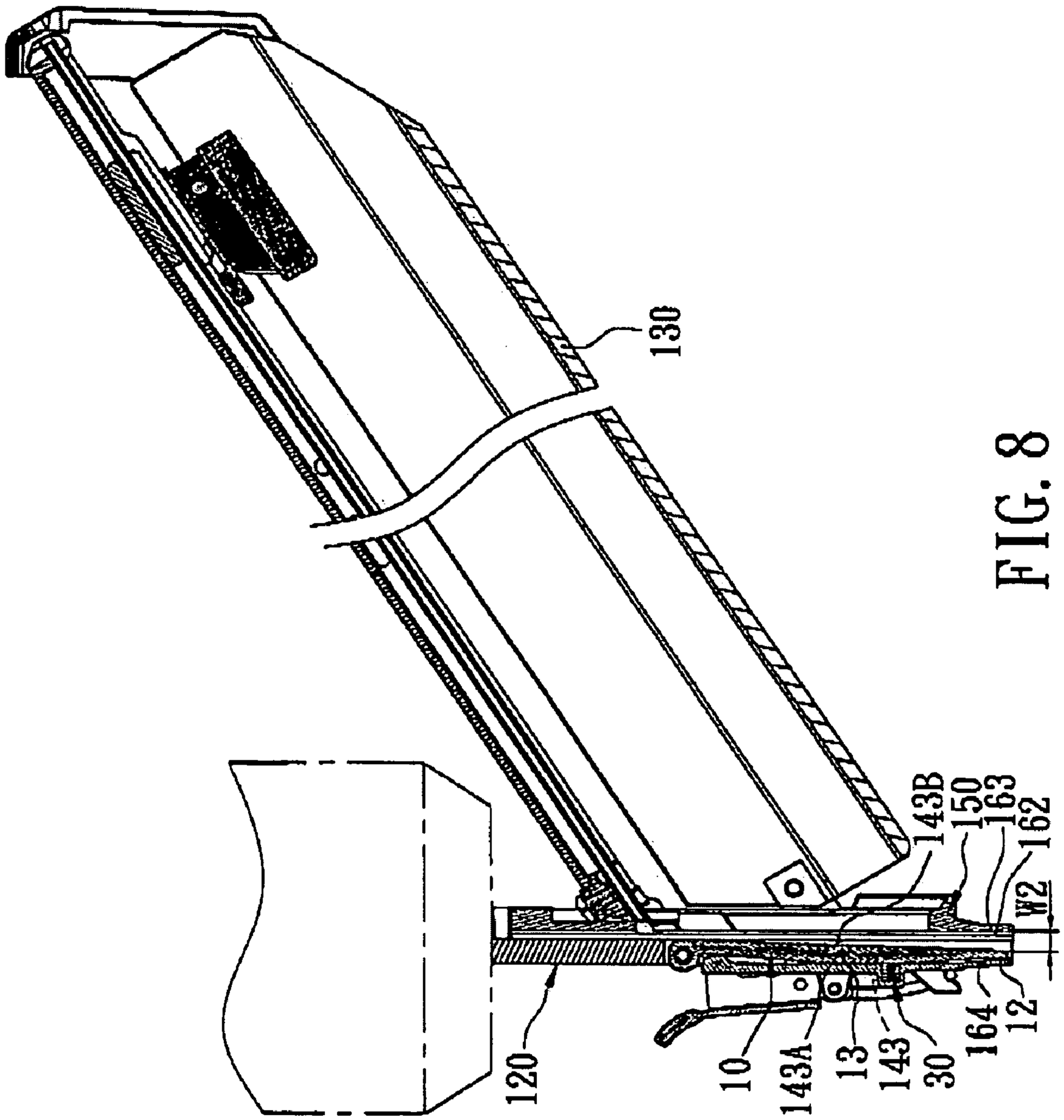


FIG. 8

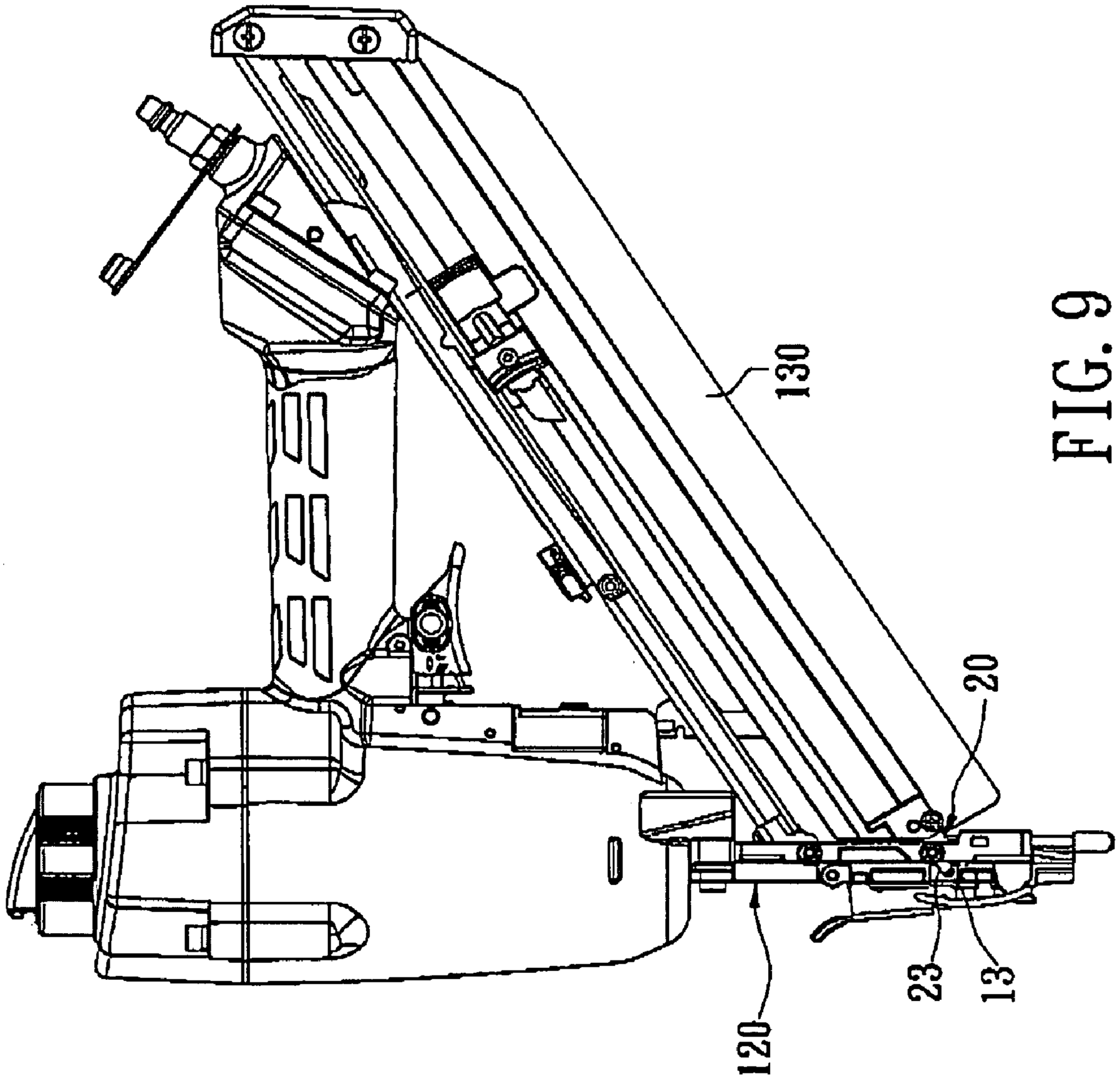


FIG. 9

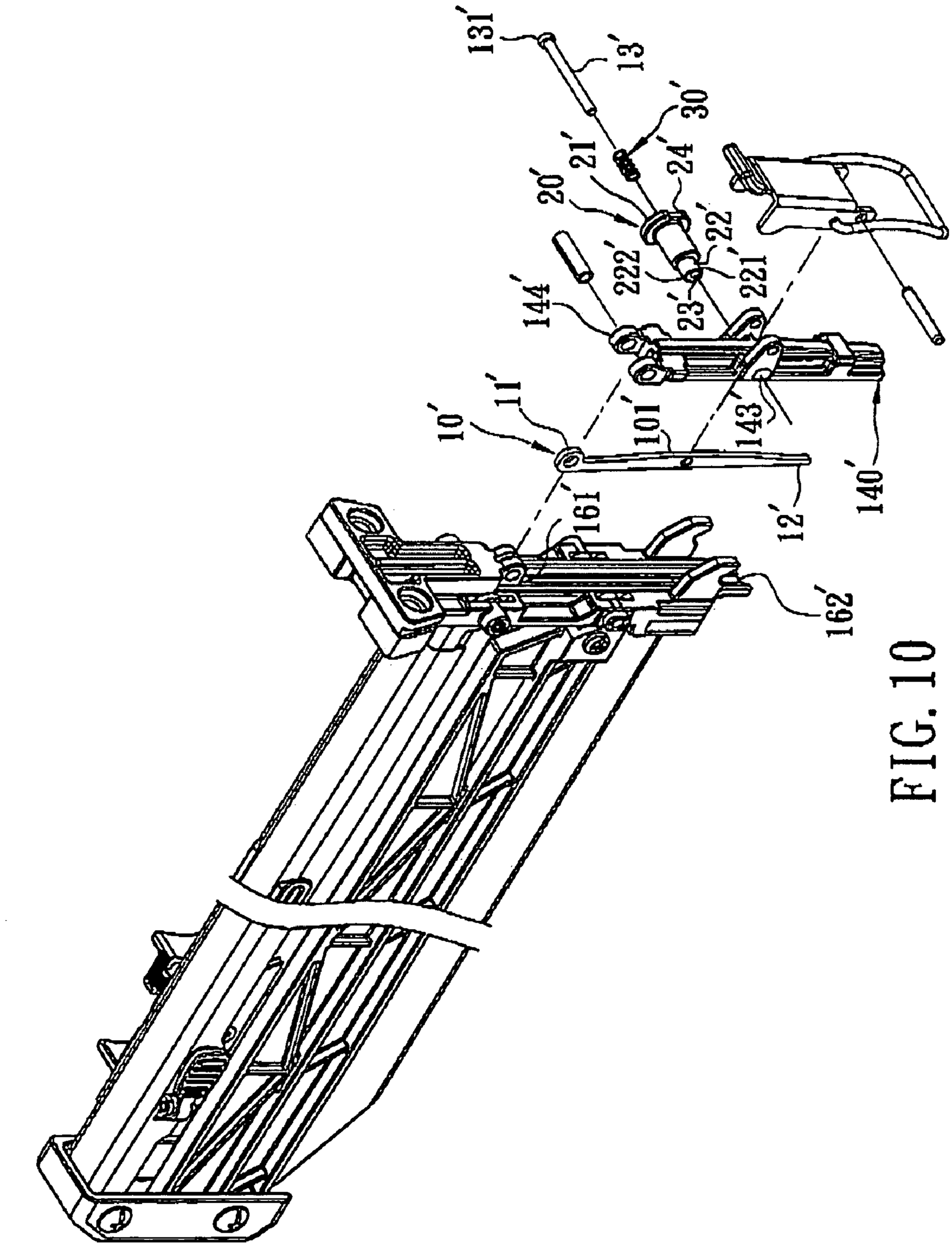


FIG. 10

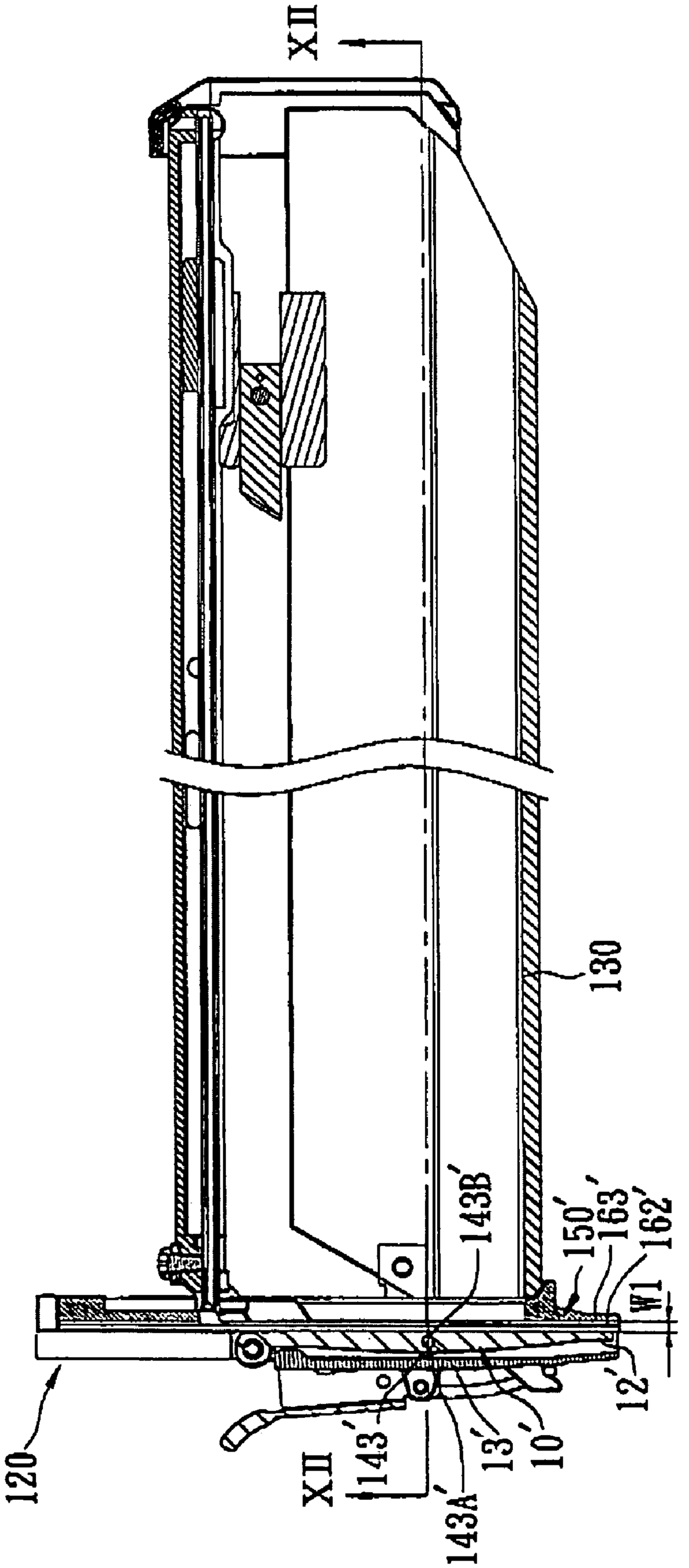


FIG. 11

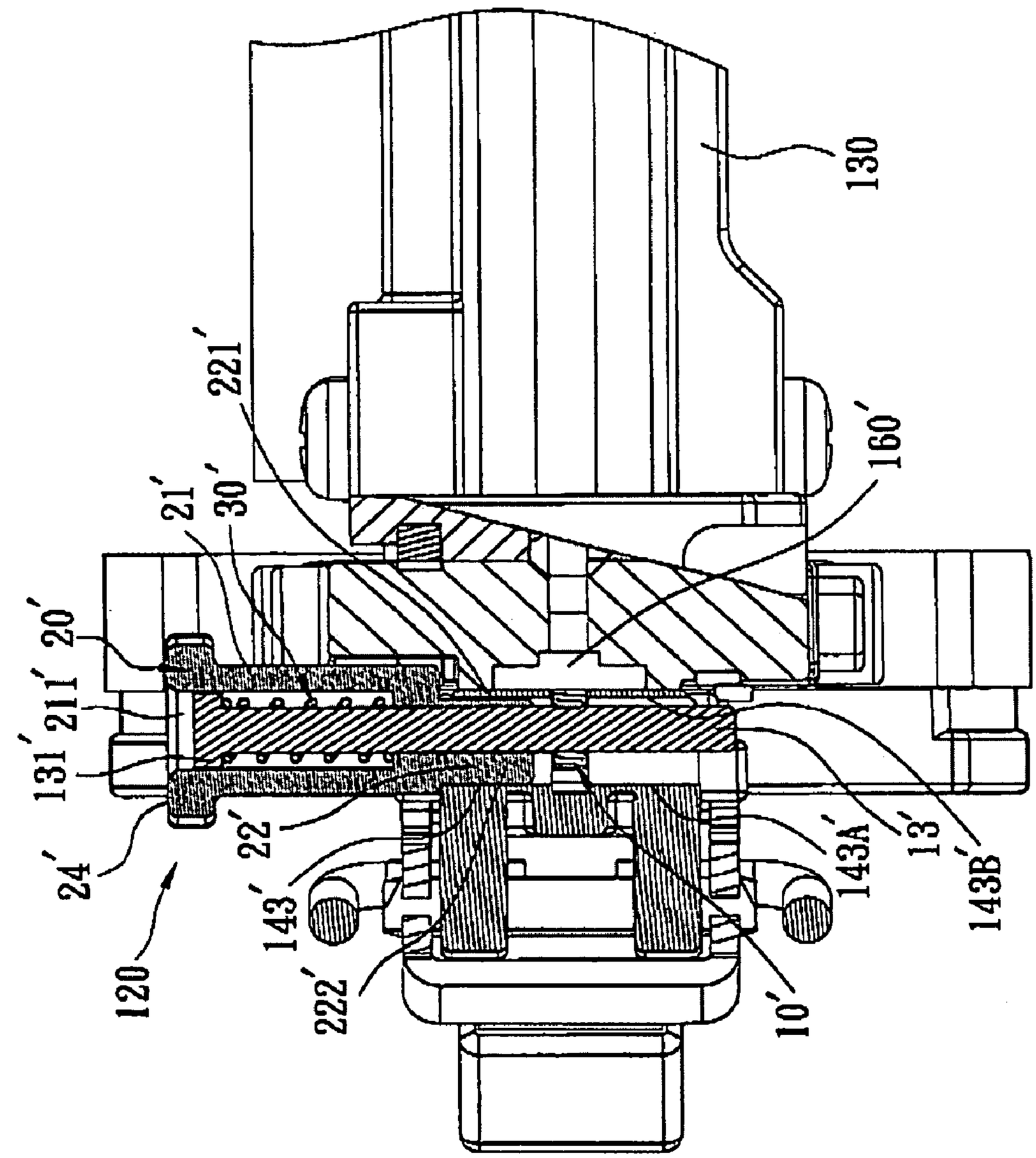


FIG. 12

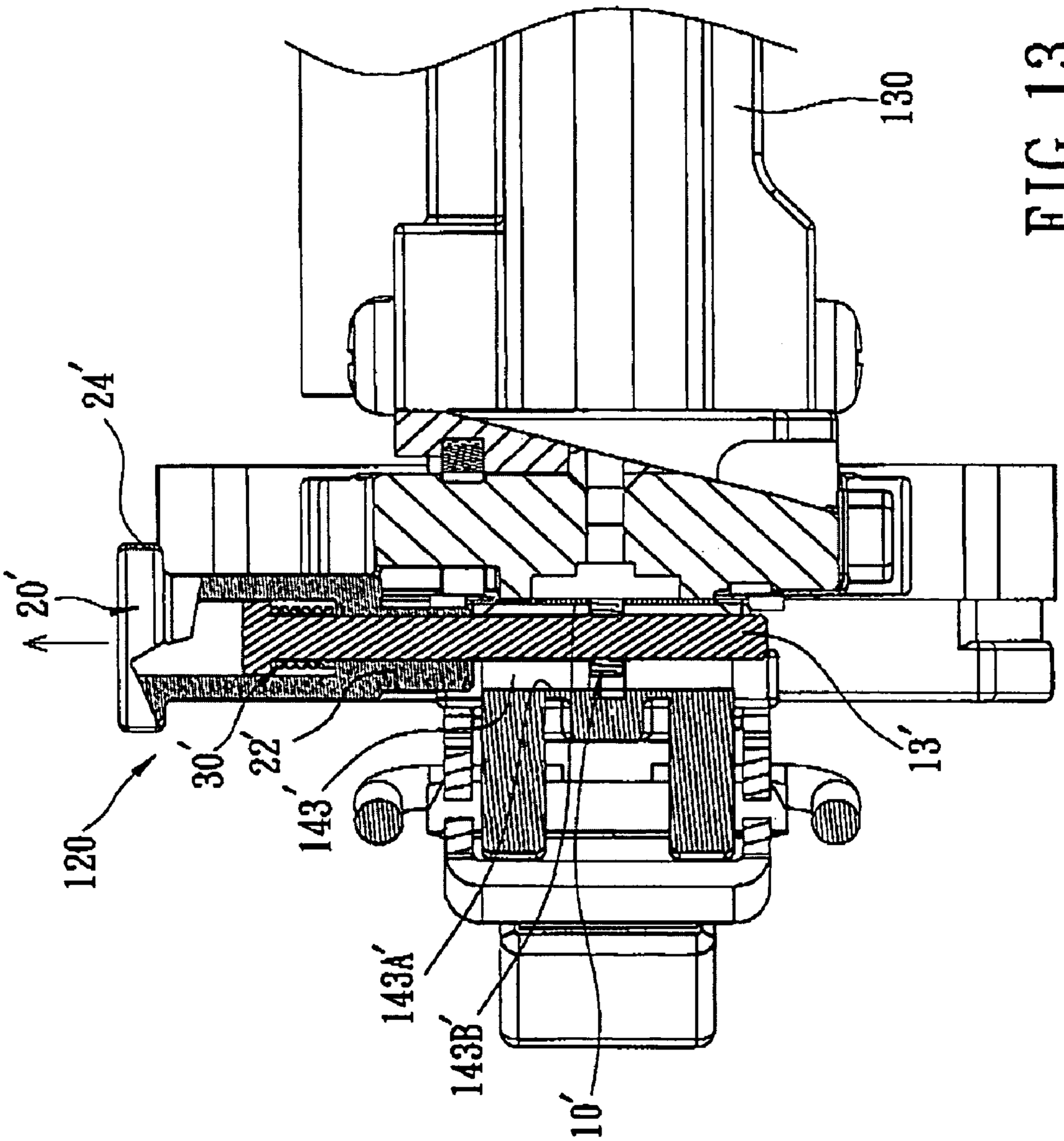


FIG. 13

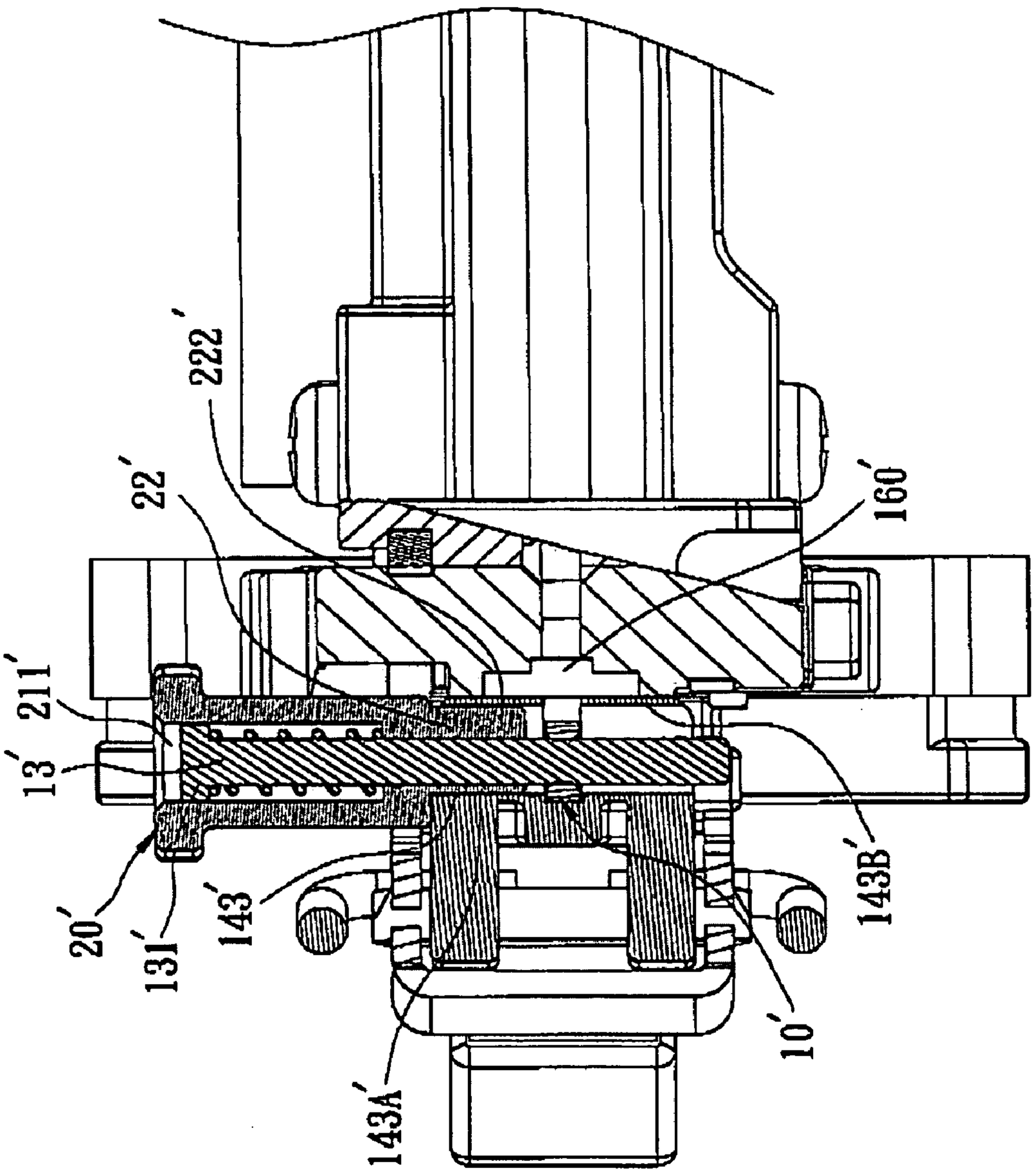


FIG. 14

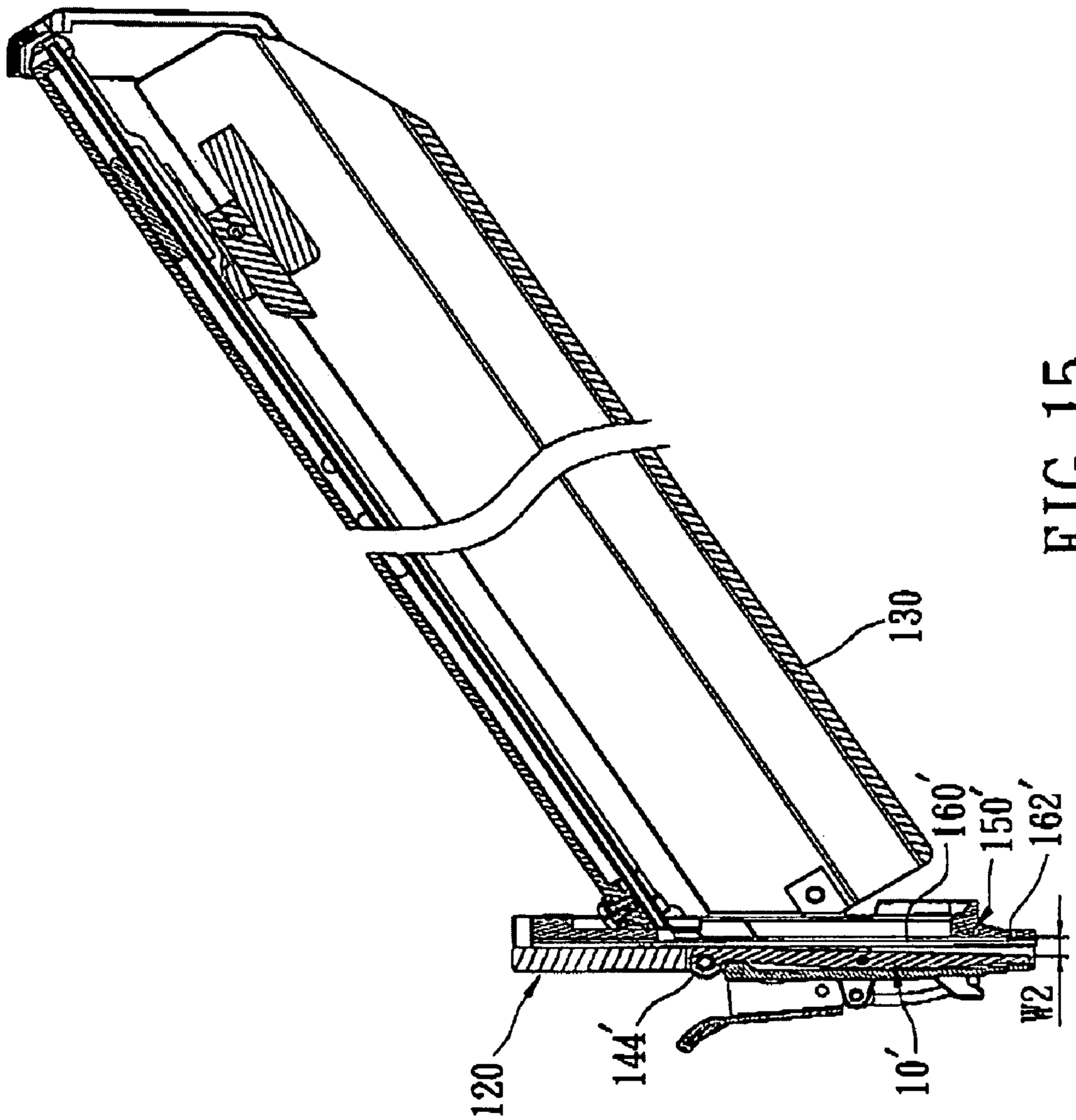


FIG. 15

NAIL GUN WITH A NAIL GUIDING UNIT

CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority of Taiwanese Application No. 096130891, filed on Aug. 21, 2007.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a nail gun, and more particularly to a nail gun that includes an adjustable nail guiding plate.

2. Description of the Related Art

Referring to FIG. **1**, a first conventional nail gun includes a body **1**, a vertical nail ejection member **2**, and a horizontal magazine member **4** for receiving a rectangular nail strip **5**.

With reference to FIG. **2**, a second conventional nail gun **1'** includes a body **11**, a nail ejection member **2'**, and an inclined magazine member **4'** extending outwardly and upwardly from the nail ejection member **2'** for receiving a parallelogram nail strip **5'**.

To increase the flexibility to use in various working spaces, a pneumatic nail gun disclosed in U.S. Pat. No. 6,431,428 includes a body, a handle, and an adjustable magazine. The magazine is rotatable to a horizontal position and an inclined position relative to the body. Due to such angle adjustability of the magazine, nails are jammed easily within a nail discharging passage in the body. Thus, it is desirable to provide an adjustable nail guiding means in the nail discharging passage to allow for smooth movement of the nails from the magazine into the nail discharging passage.

SUMMARY OF THE INVENTION

The object of this invention is to provide a nail gun that includes an adjustable nail guiding plate disposed in a nail ejection member for facilitating smooth movement of nails within the nail gun.

According to this invention, a nail gun includes a body, a handle connected fixedly to and extending laterally from the body, a nail ejecting member disposed on the body and formed with a nail discharging passage having opposite inlet and outlet ends, a magazine member connected to the nail ejection member, and an elongated nail guiding plate disposed within the nail discharging passage, and a driving member. The nail guiding plate has a pivot end disposed pivotally within the inlet end of the nail discharging passage, a free end disposed within the outlet end of the nail discharging passage, and a driven portion disposed between the pivot end and the free end. The driving member is connected to the driven portion of the nail guiding plate for driving the free end of the nail guiding plate to pivot between first and second positions.

In one embodiment, the nail ejection member is disposed under the body, and extends along a vertical direction. The magazine member is pivotable relative to the nail ejection member between a horizontal position and an inclined position. The nail discharging passage has a proximate side proximate to the magazine member and a distal side distal from the magazine member. The driving member is rotatable relative to the nail ejection member such that, when the magazine member is disposed in the horizontal position, the free end of the nail guiding plate is disposed in the first position, and is spaced apart from the proximate side of the nail discharging passage by a first horizontal distance, and when the magazine member is disposed in the inclined position, the free end of the nail guiding is disposed in the second position, and is spaced apart from the proximate side of the nail discharging passage by a second horizontal distance larger than the first horizontal distance.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features and advantages of this invention will become apparent in the following detailed description of the preferred embodiments of this invention, with reference to the accompanying drawings, in which:

FIG. **1** is a schematic side view of a first conventional nail gun;

FIG. **2** is a schematic side view of a second conventional nail gun;

FIG. **3** is an assembled perspective view of the first preferred embodiment of a nail gun according to this invention;

FIG. **4** is a fragmentary exploded perspective view of the first preferred embodiment;

FIG. **5** is a fragmentary, partly sectional side view of the first preferred embodiment when a magazine member is disposed in a horizontal position so that a free end of a nail guiding plate is disposed in a first position;

FIG. **6** is a fragmentary, partly sectional side view of the first preferred embodiment when the magazine member is disposed in the horizontal position, illustrating how the nail guiding plate is biased to pivot toward the magazine member by a resilient member so that a pin is disposed in a right slot side of a slide slot in a nail ejection plate;

FIG. **7** is a fragmentary, partly sectional side view of the first preferred embodiment when the magazine member is disposed in an inclined position, illustrating how the pin is pushed to a left slot side of the slide slot by a driving member;

FIG. **8** is a fragmentary, partly sectional side view of the first preferred embodiment when the magazine member is disposed in the inclined position so that the free end of the nail guiding plate is disposed in a second position;

FIG. **9** is a fragmentary side view of the first preferred embodiment when the magazine member is disposed in the inclined position;

FIG. **10** is a partly exploded perspective view of the second preferred embodiment of a nail gun according to this invention;

FIG. **11** is a fragmentary, partly sectional side view of the second preferred embodiment when a magazine member is disposed in a horizontal position so that a free end of a nail guiding plate is disposed in a first position;

FIG. **12** is a sectional view taken along Line XII-XII in FIG. **11**;

FIGS. **13** and **14** are fragmentary, schematic partly sectional views of the second preferred embodiment, illustrating operation of a driving member; and

FIG. **15** is a fragmentary, partly sectional view of the second preferred embodiment when the magazine member is disposed in an inclined position so that the free end of the nail guiding plate is disposed in a second position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following description, directional terms including "vertical", "upper", "lower", and other similar terms will be used to refer to the nail gun in a convenient orientation, in which the nail gun is shown in the drawings. It should be understood that this invention is not limited to any particular orientation.

Before the present invention is described in greater detail in connection with the preferred embodiments, it should be noted that similar elements and structures are designated by like reference numerals throughout the entire disclosure.

Referring to FIGS. **3**, **4**, **5**, and **6**, the first preferred embodiment of a nail gun according to this invention includes a body **100**, a handle **110** connected fixedly to and extending laterally from the body **100**, a nail ejecting member **120** disposed under and connected to the body **100** and extending along a vertical direction, an angle-adjustable magazine member **130** connected pivotally to the nail ejection member **120**, and a nail guiding unit. The nail ejection member **120** includes a nail ejection plate **140**, an intermediate plate **150**, and a nail discharging passage **160** defined between the nail ejection plate **140** and the intermediate plate **150**. The magazine member **130** is pivotable relative to the nail ejection member **120** between a horizontal position shown in FIGS. **3**, **5**, and **6**, and an inclined position shown in FIGS. **7**, **8**, and **9**. The nail ejection plate **140** has a horizontal slide slot **143**, a pivot portion **144**, and a cavity **145** in spatial communication with the nail discharging passage **160**. The intermediate plate **150** includes a pivot pin unit **151** disposed fixedly thereon and aligned with the cavity **145**. The nail discharging passage **160** has an inlet end **161** (i.e., upper end) disposed pivotally on the pivot portion **144**, an outlet end **162** opposite to the inlet end **161** along the vertical direction, a proximate side **163** proximate to the magazine member **130**, and a distal side **164** distal from the magazine member **130**. In this embodiment, the nail guiding unit includes an elongated nail guiding plate **10**, a driving member **20** for driving pivoting movement of the nail guiding plate **10**, and a resilient member **30**.

The nail guiding plate **10** is disposed within the nail discharging passage **160**, and includes a plate body **101** having a pivot end **11** disposed pivotally within the inlet end **161** of the nail discharging passage **160**, and a free end **12** disposed within the outlet end **162** of the nail discharging passage **160**, and a driven portion **13** disposed between the pivot end **11** and the free end **12**. The free end **12** of the nail guiding plate **10** is pivotable between a first position shown in FIGS. **5** and **6**, and a second position shown in FIGS. **7** and **8**. The driven portion **13** is configured as a pin connected fixedly to a middle portion of the plate body **101** and confined within and extending through the slide slot **143** along a transverse direction of the plate body **101**. The slide slot **143** has a diameter larger than that of the driven portion **13**, a left slot side **143**A distal from the magazine member **130**, and a right slot side **143**B proximate to the magazine member **130**.

In this embodiment, the driving member **20** is configured as two parallel plates each having an intermediate portion **21** sleeved rotatably on the pivot pin unit **151** of the intermediate plate **150**, an anchor end **22** connected fixedly to the magazine member **130**, a driving end **23** opposite to the anchor end **22** and formed with a groove **24**, and a pushing face **241** defining a top end of an opening **240** of the groove **24**. The openings **240** in the driving member **20** face the distal side **164** of the nail discharging passage **160**. As such, the driving member **20** is co-rotatable with the magazine member **130** relative to the nail ejection member **120**.

The resilient member **30** is configured as a coiled compression spring, and is disposed between the nail guiding plate **10** and the nail ejection member **120** for biasing the free end **12** of the nail guiding plate **10** toward the first position. In this embodiment, the resilient member **30** is disposed within the cavity **145** in the nail ejection plate **140**.

With particular reference to FIGS. **5** and **6**, when the magazine member **130** is disposed in the horizontal position, the driven portion **13** of the nail guiding plate **10** is disposed

within the grooves **24** in the driving member **20** and the right slot side **143**B of the slide slot **143** in the nail ejection plate **140** due to the biasing action of the resilient member **30**. Hence, the free end **12** of the nail guiding plate **10** is disposed in the first position, and is spaced apart from the proximate side **163** of the nail discharging passage **160** by a first horizontal distance (W**1**) Due to the angle-adjustability of the nail guiding plate **10**, nails can be moved smoothly from the magazine member **130** into the nail discharging passage **160**. Thus, the object of this invention is achieved.

With particular reference to FIGS. **7** and **8**, when the magazine member **130** is pivoted upwardly about the pivot pin unit **151** from the horizontal position to the inclined position, the driving member **20** pivots downwardly about the pivot pin unit **151** so that the pushing faces **241** of the driving member **20** push and pivot the driven portion **13** to the left slot side **143**A of the slide slot **143** in the nail ejection plate **140**. Hence, the free end **12** of the nail guiding plate **10** is pivoted to the second position, and is spaced apart from the proximate side **163** of the nail discharging passage **160** by a second horizontal distance (W**2**) that is larger than the first horizontal distance (W**1**).

In this embodiment, pivoting movement of the magazine member **130** about the pivot pin unit **151** between the horizontal position and the inclined position results in pivoting movement of the free end **12** of the nail guiding plate **10** about the pivot end **11** between the first and second positions, thereby resulting in convenience during use.

FIGS. **10**, **11**, and **12** show the second preferred embodiment of a nail gun according to this invention. In this embodiment, the nail guiding unit includes a nail guiding plate **10'**, a driving member **20'** for driving pivoting movement of the nail guiding plate **10'**, and a coiled compression spring **30'**, and the nail ejection plate **140'** has a horizontal slide slot **143'** and a pivot portion **144'**.

The nail guiding plate **10'** is disposed within the nail discharging passage **160'**, and includes a plate body **101'** having a pivot end **11'** disposed pivotally on the pivot portion **144'** of the nail ejection plate **140'** and within the inlet end **161'** of the nail discharging passage **160'**, and a free end **12'** opposite to the pivot end **11'** and disposed within the outlet end **162'** of the nail discharging passage **160'**, and a driven portion **13'** connected fixedly to a middle portion of the plate body **101'** and disposed between the inlet and outlet ends **161'**, **162'**. The driven portion **13'** is configured as a pin confined within and extending through the slide slot **143'** along a transverse direction of the plate body **101'**, and has an enlarged head **131'** disposed outwardly of the nail ejection plate **140'**. The diameter of the slide slot **143'** is larger than that of the driven portion **13'** so as to allow the driven portion **13'** to move transversely within the slide slot **143'**. The driving member **20'** has a hollow outer cylindrical portion **21'**, a hollow inner cylindrical portion **22'** formed with an eccentric hole **23'**, and an outward flange **24'**. The inner cylindrical portion **22'** is disposed fittingly and rotatably within an upper end of the slide slot **143'**. The driven portion **13'** extends fittingly through the eccentric hole **23'** in the inner cylindrical portion **22'**. As such, when the driving member **20'** is rotated, the driven portion **13'** moves within the slide slot **143'**. The outer cylindrical portion **21'** has a lower end connected eccentrically to an upper end of the inner cylindrical portion **22'**, an upper end exposed outwardly of the nail ejection member **120** and operable to rotate the inner cylindrical portion **22'** within the slide slot **143'**, and an outer diameter larger than that of the inner cylindrical portion **22'**. The outward flange **24'** extends radially and outwardly from the upper end of the outer cylindrical portion **21'** so as to allow for convenient upward pulling

of the driving member **20'**. The head **131'** of the driven portion **13'** is disposed within the outer cylindrical portion **21'** of the driving member **20'**. The driving member **20'** further has a bolt **211'** (see FIG. **12**) that is threaded in the upper end of the outer cylindrical portion **21'** to constitute an upper end wall of the outer cylindrical portion **21'** for confining the head **131'** of the driven portion **13'** between the bolt **211'** and a lower end wall of the outer cylindrical portion **21'**. The coiled compression spring **20'** is sleeved on the driven portion **13'** between the head **131'** of the driven portion **13'** and the lower end wall of the outer cylindrical portion **21'** for biasing the head **131'** of the driven portion **13'** to abut against the bolt **211'**, as shown in FIG. **12**.

When it is desired to use the nail gun in such a manner that the magazine member **130** is disposed in a horizontal position shown in FIG. **11**, the driving member **20'** is rotated to a first angular position shown in FIG. **12**. In the first angular position, the thinnest portion **221'** of the inner cylindrical portion **22'** of the driving member **20'** is disposed between the driven portion **13'** and the magazine member **130**, and the driven portion **13'** is disposed in a right slot side **143**B' of the slide slot **143'**. As such, the free end **12'** of the nail guiding plate **10'** is disposed in a first position, and is spaced apart from the proximate side **163** of the nail discharging passage **160'** by a first horizontal distance (W**1**), as shown in FIG. **11**.

When it is desired to use the nail gun in such a manner that the magazine member **130** is disposed in an inclined position shown in FIG. **15**, the outward flange **24'** of the driving member **20'** is first pulled upwardly away from the driven portion **13'** such that the coiled compression spring **30'** is compressed, as shown in FIG. **13**. Next, the driving member **20'** is rotated by 180 degrees, and is then released. Hence, the driving member **20'** is biased by the coiled compression spring **30'** to move downwardly toward the driven portion **13'** until it is moved to a second angular position shown in FIG. **14** so that the bolt **211'** abuts against the head **131'** of the driven portion **13'**. In the second angular position, the thickest portion **222'** of the inner cylindrical portion **22'** of the driving member **20'** is disposed between the driven portion **13'** and the magazine member **130**, and the driven portion **13'** is disposed in a left slot side **143**A' of the slide slot **143'**. As such, the free end **12'** of the nail guiding plate **10'** is disposed in a second position, and is spaced apart from the proximate side **163** of the nail discharging passage **160'** by a second horizontal distance (W**2**), as shown in FIG. **15**.

In this embodiment, to pivot the free end **12'** of the nail guiding plate **10'** between the first and second positions, it is necessary to operate manually the driving member **20**.

With this invention thus explained, it is apparent that numerous modifications and variations can be made without departing from the scope and spirit of this invention. It is therefore intended that this invention be limited only as indicated by the appended claims.

We claim:

1. A nail gun comprising:

a body;

a handle connected fixedly to and extending laterally from said body;

a nail ejecting member disposed on said body and formed with a nail discharging passage having opposite inlet and outlet ends;

a magazine member connected to said nail ejection member; and

a nail guiding unit including:

an elongated nail guiding plate disposed within said nail discharging passage and including a pivot end disposed pivotally within said inlet end of said nail discharging passage, a free end disposed within said outlet end of said nail discharging passage, and a driven portion disposed between said pivot end and said free end, and

a driving member connected to said driven portion of said nail guiding plate for driving said free end of said nail guiding plate to pivot between first and second positions, wherein

said nail ejection member is disposed under said body, and extends along a vertical direction,

said magazine member is pivotable relative to said nail ejection member between a horizontal position and an inclined position, and

said driving member is co-rotatable with said magazine member relative to said nail ejection member such that, when said magazine member is disposed in said horizontal position, said free end of said nail guiding plate is disposed in said first position, and when said magazine member is disposed in said inclined position, said free end of said nail guiding plate is disposed in said second position.

2. The nail gun as claimed in claim **1**, wherein:

said nail discharging passage has a proximate side proximate to said magazine member and a distal side distal from said magazine member;

when said magazine member is disposed in said horizontal position, said free end of said nail guiding plate is spaced apart from said proximate side of said nail discharging passage by a first horizontal distance; and

when said magazine member is disposed in said inclined position, said free end of said nail guiding plate is spaced apart from said proximate side of said nail discharging passage by a second horizontal distance larger than said first horizontal distance.

3. The nail gun as claimed in claim **1**, wherein said nail guiding unit further includes a resilient member disposed between said nail guiding plate and said nail ejection member for biasing said free end of said nail guiding plate to pivot toward said first position.

4. The nail gun as claimed in claim **3**, wherein said driving member has an intermediate portion disposed pivotally on said nail ejection member, an anchor end connected fixedly to said magazine member, and a driving end opposite to said anchor end and connected to said driven portion of said nail guiding plate.

5. The nail gun as claimed in claim **4**, wherein said driving end of said driving member is formed with a groove, said driven portion of said nail guiding plate being disposed within said groove when said free end of said nail guiding plate is disposed in said first position.

6. The nail gun as claimed in claim **5**, wherein said groove in said driving end of said driving member has an opening facing said distal side of said nail discharging passage, said nail guiding plate further including a plate body, said plate body having said pivot end and said free end, said driven portion of said nail guiding plate being configured as a pin connected fixedly to said plate body and extending along a transverse direction of said plate body, said driving end of said driving member being further formed with a pushing face defining a top end of said opening and shaped such that, when said magazine member is pivoted from said horizontal position to said inclined position, said pushing face pushes and pivots said pin toward said distal side of said nail discharging passage.

7. The nail gun as claimed in claim **6**, wherein said nail ejection member is further formed with a horizontal slide slot

having a diameter larger than that of said pin, said pin being confined within said slide slot.

8. The nail gun as claimed in claim **1**, wherein:

said nail guiding plate further includes a plate body, said driven portion of said nail guiding plate being configured as a pin connected fixedly to said plate body and extending along a transverse direction of said plate body;

said nail ejection member is further formed with a horizontal slide slot having a diameter larger than that of said pin, said pin being confined within said slide slot; and

said driving member has a hollow inner cylindrical portion disposed fittingly and rotatably within an upper end of said slide slot and formed with an eccentric hole, said pin extending fittingly through said eccentric hole in said inner cylindrical portion, said driving member being rotatable to move said pin within said slide slot.

9. The nail gun as claimed in claim **8**, wherein said driving member further has a hollow outer cylindrical portion having a lower end connected eccentrically to an upper end of said inner cylindrical portion, an upper end exposed outwardly of said nail ejection member and operable to rotate said inner cylindrical portion within said slide slot, and an outer diameter larger than that of said inner cylindrical portion.

10. The nail gun as claimed in claim **9**, wherein said pin has a head disposed within said outer cylindrical portion of said driving member, said outer cylindrical portion having opposite upper and lower end walls, said nail gun further comprising a coiled compression spring sleeved on said pin between said head of said pin and said lower end wall of said outer cylindrical portion of said driving member for biasing said head of said pin to abut against said upper end wall.

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